icomera

Moovbox M220

Quick Start Guide

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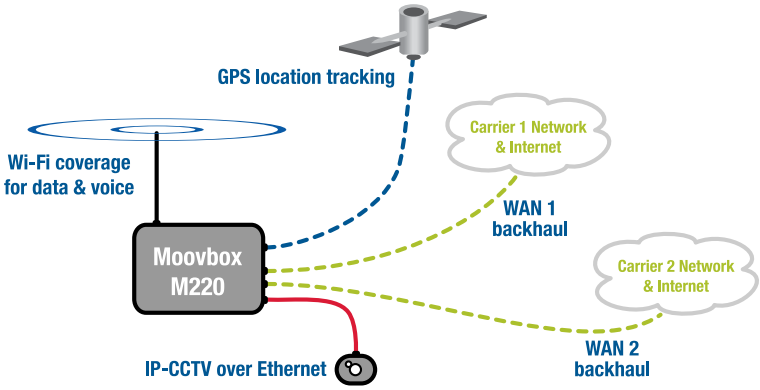
1 Introducing the Moovbox M220

The Moovbox M220 from Icomera is a rugged mobile broadband gateway that delivers commercial-class Wi-Fi access, Ethernet connectivity and GPS tracking over a range of carrier-class backhaul networks.

Designed for mounting inside vehicles or temporary locations that require broadband access, the dual-WAN Moovbox M220 provides a bridge between Wi-Fi client devices and mobile carrier technologies including 3G HSPA, EV-DO, WiMAX and other network types. With plug-and-play support for a growing number of worldwide providers, the Moovbox offers Internet access on the move wherever carrier networks provide coverage.

The bulkhead-mounting Moovbox draws power from the vehicle electrics system, and features external connectors for cabin-located Wi-Fi antenna and a glass or roof mounted WAN and GPS antenna. The Moovbox has an integrated GPS receiver, providing real-time location reporting via the optional MoovManage Track service or any compatible third party tracking system. The Moovbox is housed in a rugged aluminium enclosure ensuring it can sustain in-vehicle or in-building operation in even the most demanding situations.



2 Getting Started

The Moovbox package contains almost everything you need to start delivering Internet connectivity on the move. This section will help you get your Moovbox set up and configured.

2.1 Unpacking the Moovbox

You should have received a box containing the following items:

- 1 x Moovbox M220 mobile broadband gateway
- 1 x Wi-Fi 3dBi 'rubber duck' antenna with RP-TNC connector (a second for diversity is available from you supplier SKU 3000000001)
- 1 x RJ-45 Ethernet crossover cable (1m)
- 1 x Quick Start Guide
- 1 x Torx key
- 1 x Bag of PCI express mini card screws (Note the longer screws are for the Icomera add on board)

Please check that you have all of these items before continuing. If anything is missing, please contact your supplier. You will also need the following additional items:

2.2 Power Supply

Depending on your installation environment, you can either power the Moovbox via the 12-36V DC Molex power input, or via a Power-over-Ethernet (PoE) adapter. Use only an Icomera recommended M220 PoE as listed below. If you are unsure of what type of power source you should use, or do not have access to either, please contact your supplier. Options include:

- In-vehicle 12VDC cigarette lighter adapter (SKU 3000000004)

- M220 100-240v to 18V DC UK Power over Ethernet Adaptor (SKU 3000000049)
- M220 100-240v to 18V DC EU Power over Ethernet Adaptor (SKU 3000000050)

2.3 PCI Express Mini Card WAN Modem

To enable your Moovbox to connect to the Internet you will need a PCI express mini card WAN modem and an active cellular data subscription.
Typically this would be a 3G/HSPA, EV-DO or WiMAX WAN modem from a wireless broadband provider or from you Moovbox supplier. Your Moovbox will not work without a supported WAN modem installed and operational, so check with your supplier for more information about carriers and WAN modems supported in your region.

2.4 External cellular antenna (and optional GPS)

Once your WAN modem is installed in the Moovbox (see Installing WAN modems below) you will need an external antenna connected to the Moovbox to receive and transmit. The type of antenna you choose is entirely dependent on the installation environment. For example, if you are installing the Moovbox in a car or small commercial vehicle, then a dash or window-mounting antenna may be adequate. But in a larger vehicle, an external roof-mounting antenna may be required especially if you are planning to use the Moovbox GPS functionality. Please consult your supplier for recommended antennas that are compatible with the Moovbox and your deployment. Most common options include:

- Dash/Window GPS/Cellular antenna (SKU 3000000002)
- Roof-mounting GPS/Cellular antenna (SKU 3000000003)

2.5 Requirements for setting up

The Moovbox is configured via web interface (MoovAdmin) that is embedded in the Moovbox and accessed via any Javascript-enabled web browser. You may connect your computer to the Moovbox either over the Wi-Fi interface or via the Ethernet interface; a cross-over cable is supplied with the Moovbox for the latter. So before you start make sure you have the following:

- One or two WAN modems with active service subscription
- An appropriate Moovbox power supply
- A computer enabled with either Wi-Fi or Ethernet
- The supplied crossover cable if you plan to connect via Ethernet

2.6 Installing WAN modems and SIMs

Your Moovbox may have been supplied with a WAN modem preinstalled and configured for operation. If so, then you can skip this section.

If you are installing the WAN modems yourself, then make sure you've turned off the Moovbox and disconnected it from the power supply before opening it.

Follow the steps below to open the Moovbox and install the WAN radio.

1. Locate the six Torx screws that secure the upper and lower enclosure halves and remove them using the included Torx key, being sure to store them in a safe place.
2. Carefully lift the top chassis from the lower chassis, and place to one side.
3. Insert modem 1 into the upper slot on the Icomera add-on board; WAN 1. Insert the modem in at a 45 degree angle and push the back down towards the board (See Figure 2.1). Ensure the modem is properly seated in the slot with the two screw holes of the modem lining up with the posts on the board. Push down the modem and affix using the screws provided; this will keep it firmly in place during use.

Figure 2.1: Insert the modem at an angle

Note: The larger screws are for WAN 1 on the Icomera add-on board

4 Locate the WAN 1 main and aux pigtail and connect this to main and aux connectors on the WAN 1 modem respectively, ensuring the connections are properly made. If you are using dual WAN repeat this process for WAN 2.

Your installation should look like Figure 2.2.

Figure 2.2: Modem connectors

5 Insert the SIM card(s) in the slots next to the WAN modems. Remember WAN 1 is the upper slot on the Icomera add-on board and WAN 2 is the lower slot

on the mother board. Lift the SIM card holder as shown below and insert the SIM card with the contacts facing down. Close the SIM card holder and slide to lock (see Figure 2.3).

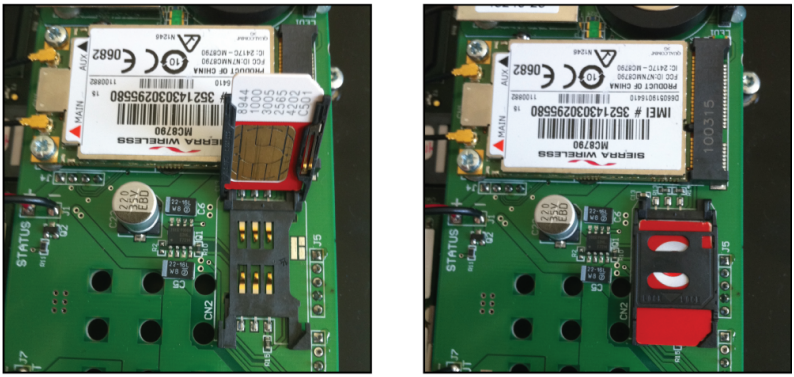


Figure 2.3: Inserting the SIM card

6 Gently refit the top chassis and replace the six screws you removed earlier, making sure not to overtighten them.

7 The installation of the SIM and WAN modems is now complete. See Figure 2.4.

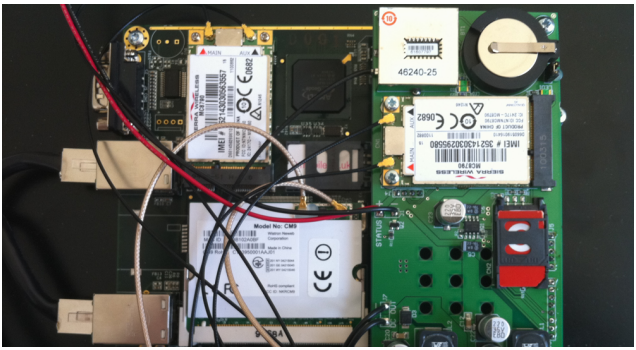


Figure 2.4: The finished SIM and WAN modem installation

2.7 Attaching the antennas

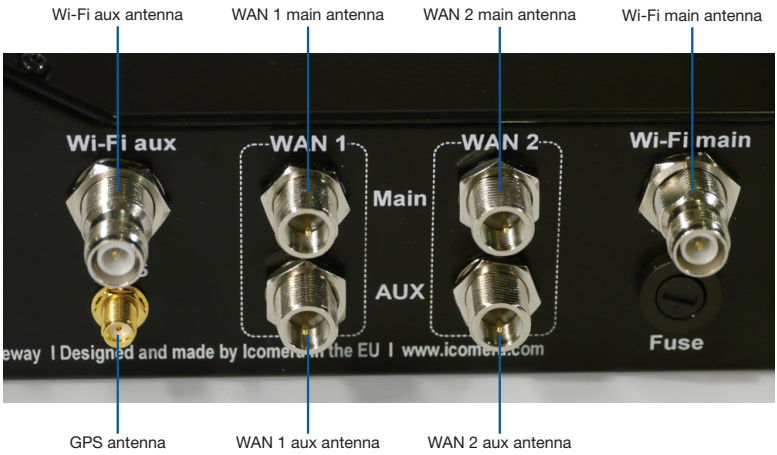


Figure 2.5: Antenna connectors

Wi-Fi

Your Moovbox is supplied with one 3dBi omnidirectional antenna (a second for diversity is available from you supplier SKU 3000000001) which should provide good coverage for most in-vehicle and in-building deployments. Simply attach the antenna to the Moovbox connector marked 'Wi-Fi Main'. The antenna has a tilt and swivel joint enabling you to adjust it for optimal coverage. However some installations may require an alternative antenna such as a directional button, patch or panel type. Contact your supplier for more information about different Wi-Fi antennas available.

Note: The Moovbox WI-Fi connectors are RP-TNC. If you plan to use a different antenna to that supplied, ensure it has an RP-TNC plug connector.

WAN

As described above you will need an external cellular antenna compatible with the carrier network you wish to connect to. For example this may be a GSM/3G antenna

capable of working at multiple frequencies that attaches to your vehicle's window or dash. A wide variety of antennas are available; check with your supplier for the most appropriate antenna for your specific application and network provider. If you are not using diversity connect your cellular antenna cables to the Moovbox connectors marked 'WAN 1 main' and 'WAN 2 main'.

Note: The Moovbox WAN connectors are FME and your antenna cable FME jack screws inside the bulkhead.

GPS

If you plan to use the Moovbox GPS functionality to enable remote device tracking, you will need an appropriate GPS antenna. Some cellular antennas are available combined with a GPS antenna. Connect your GPS antenna cable to the Moovbox connector marked 'GPS'.

Note: The Moovbox GPS connector is an SMA. If you plan to use a different antenna to that supplied, ensure it has an SMA plug

2.8 Choosing a power supply

The Moovbox M220 can be powered either via the 'Ethernet 1 / PoE' port using a Power-over-Ethernet power supply[1], or via the green 12-36VDC Molex power input. Choosing the most appropriate supply will depend on your installation.

Note: The 'Ethernet 2' port does not support PoE.

If you plan to use the Moovbox indoors and have access to a standard 100-240VAC power supply, then consider using the optional PoE power supply. If you are using the Moovbox in a vehicle but require portability, then consider using the 12-36VDC connector with the optional 12VDC cigarette adapter SKU 3000000004

Note: The Molex power input connector is labeled for positive and negative connections; ensure that you connect the right polarity to each input. The Moovbox contains a bridge rectifier in case the connections are accidentally switched thus protecting your Moovbox.

[1] Use only the Icomera M220 certified PoE SKU 3000000049/50.

If you are intending to permanently install the Moovbox in a vehicle, then you should plan to wire the 12-36VDC connector into the vehicle's electrical system. Many of Icomera's Channel Partners are professionally qualified to perform these installations for you, including mounting antennas and running cables, with minimal visual impact.

2.9 Turning on your Moovbox

Once you've chosen your power supply and have the Moovbox connected, turn on the power. The red 'Power' LED on the connector panel will illuminate and the Moovbox will begin its start up process which can take up to two minutes from a cold start.

Note: The green 'Status' LED does not light until a PPP WAN connection has been established with your carrier. As a result the LED will not illuminate until the WAN modem is fully configured.

2.10 Connecting to the Moovbox

The Moovbox is factory-enabled to allow administrative access to the device over either the Ethernet interface. This Quick Start Guide describes the process for connecting to your Moovbox securely over the Ethernet interface. Further information about use of the Wi-Fi interface for device configuration can be found in the MoovAdmin Reference Guide.

The first step is to establish a connection from your computer to the Moovbox using your computer's Ethernet interface.

1. Connect the supplied Ethernet cross-over cable between your laptop and the Moovbox.
2. Set your computer to receive an IP address via DHCP on the Ethernet interface; refer to your operating system's instruction manual if you do not know how to do this.
3. The Moovbox DHCP server will provide an IP address to your computer; confirm this before moving onto the next step. If you do not see that your computer has been assigned an IP address in the range 192.168.0.x, then check your Ethernet cable and network configuration and try again.

The Moovbox is configured via a secure web application called MoovAdmin which resides on the Moovbox. To log into MoovAdmin:

1. Launch your Javascript-enabled web browser.
2. In the browser's address field, type `https://192.168.0.10/`. Ensure you specify HTTPS and not HTTP otherwise you will not connect.
3. Press Enter. You may be prompted to accept the security certification. Do so to continue.
4. At the prompt, enter 'admin' in the User field and 'password' in the Password field.

Note: For security reasons you should change the password the first time you configure your Moovbox. Usernames and passwords are case sensitive.
After connecting, the MoovAdmin Status page will appear and you are ready to configure the device. If you cannot log into your Moovbox, please refer to the Troubleshooting section.

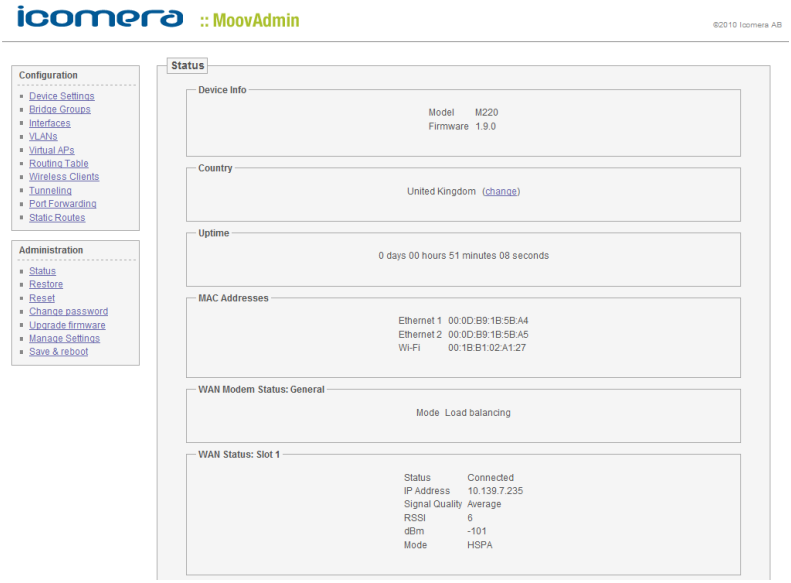


Figure 2.6: The MoovAdmin status page

2.11 Using MoovAdmin to configure the cellular modem

Having connected to the Moovbox, you should see the MoovAdmin status screen as illustrated above. If your device did not ship with a preconfigured modem already installed, you'll need to set up the Moovbox to work with your own. To configure the modem:

1. In the Configuration menu (upper left) choose Device Settings.
2. In the WAN Radio pane, enter the appropriate details for your provider. Most mobile network providers require an APN, Username and Password. If you do not know what details to enter, contact your Moovbox supplier, wireless broadband provider, visit `http://www.taniwha.org.uk/gprs.html` or you can try Googling 'cellular APN list' which results in a number of sources for worldwide APNs, usernames and passwords.
3. In the Backhaul Preference pop-up select the desired type of data connection. If you're using a 3G HSPA mobile carrier network, choosing 'UMTS/HSPA Preferred' would prioritize the fastest possible connection but allow the connection to fall back to GPRS/EDGE when UMTS/HSDPA coverage is not available.

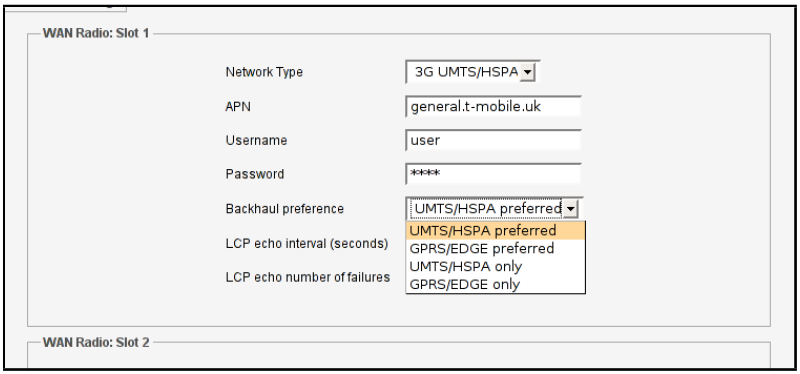


Figure 2.7: The WAN modem configuration options in MoovAdmin

4. Apply the changes by clicking the Apply button at the foot of the pane.
5. Now you must save your changes and reboot the unit. In the Administration pane, choose Save & Reboot and then click the Save and Reboot button.

You should now be ready to test your device's Internet connection:

6 Connect to the Moovbox wireless network (SSID 'Moovbox').
7 Launch your web browser.
8 Go to `http://www.speedtest.net/`
9 Choose a server closest to your location and run the speed test to get a fairly accurate report on the uplink and downlink speed of your connection.

Note: Don't do anything else on your computer while the test is running.

The speed test results will be displayed; you may wish to run this test several times over a period of 5-10 minutes to get an average reading of your speed. If you cannot load the speed test page or any other web site, please refer to the Troubleshooting section.

2.12 MoovManage and GPS tracking (MoovTrac)

The Moovbox M220 features a built-in GPS receiver that, with an appropriate GPS antenna attached, 'samples' the position of the device every 5 seconds. These coordinates are cached and then transmitted from the Moovbox over the cellular network to Icomera's data center every thirty seconds. You will need a subscription to the MoovManage service to view your device's position on a map in near real-time.

To enable your MoovManage account:

1 In the Configuration menu (upper left) choose Device Settings.
2 In the Device Settings > MoovManage pane, check the Enable checkbox to turn on MoovManage support.
3 Apply the changes by clicking the Apply button at the foot of the pane.
4 Now you must save your changes and reboot the unit. In the Administration pane, choose Save & Reboot and then click the Save and Reboot button. When the Moovbox has rebooted, the Status screen will display the GPS information (See Figure 2.8).

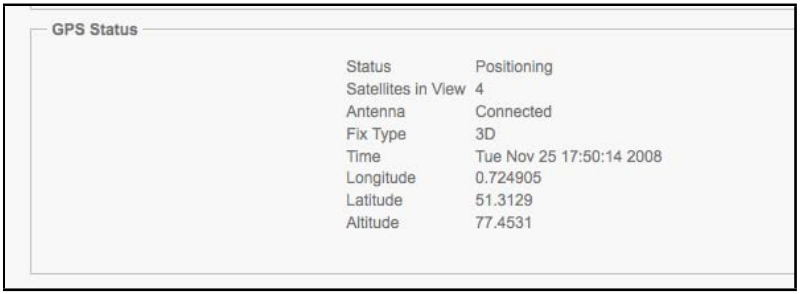


Figure 2.8: GPS status in MoovAdmin

2.13 Setting up a Captive Portal

By default, the Moovbox ships with the Ethernet and Wi-Fi interfaces routed to the WAN modem on a two bridge groups; Ethernet on 'Default' and Wi-Fi on 'Access Point'. This configuration enables traffic from both interfaces to connect to the Internet, and thus lets the Moovbox work out of the box. Further information about the use of bridge groups can be found in the MoovAdmin Reference Guide.

Some situations will need the Moovbox configured so that traffic originating on the Wi-Fi interface is directed to a splash page, or 'captive portal', when users try to connect. This is useful in a public hotspot application, for example. You can use your own RADIUS-based system to manage authentication and management of Wi-Fi users, or use the optional MoovManage service which has built-in captive portal functionality.

The following steps describe how to configure the Moovbox for use with the MoovManage captive portal.

1. The first step is to assign a Captive Portal to the Access Point bridge group. In the Configuration menu (upper left) choose Bridge Groups, and in the Bridge Groups pane click the Access Point bridge group Edit button.
2. In the Edit Bridge Group pane, click the Edit Captive Portal button. The Captive Portal pane will appear (see Figure 2.9); select MoovManage and click the Apply button.

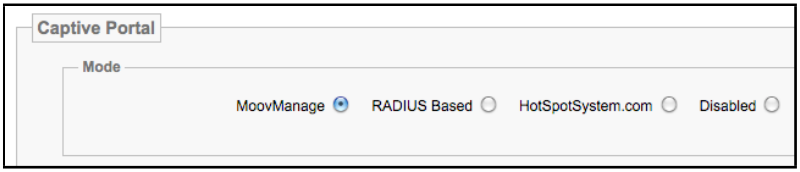


Figure 2.9: Captive portal options in MoovAdmin

3 Choose Configuration > Bridge Groups, and check the settings look like those shown in Figure 2.10. Choose Administration > Save & Reboot to store the changes. Further information about configuring the MoovManage captive portal can be found in the MoovManage Reference Guide.

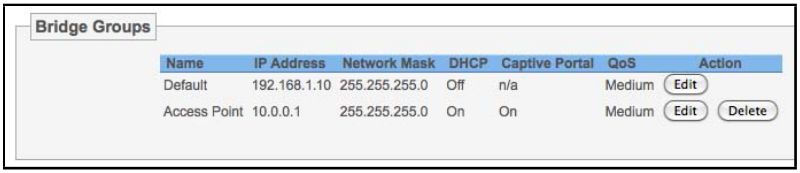

Bridge Groups
Name IP Address Network Mask DHCP Captive Portal QoS Action
Default 192.168.1.10 255.255.255.0 Off n/a Medium Edit
Access Point 10.0.0.1 255.255.255.0 On On Medium Edit Delete

Figure 2.10: The Bridge Groups configuration page in MoovAdmin

3 Vehicle Installation

The Moovbox delivers mobile broadband connectivity to vehicles large and small. This section will help you understand how to optimize your in-vehicle Moovbox installation.

3.1 Choosing a suitable location for your equipment

To get the best out of your Moovbox when planning an in-vehicle deployment, you need to consider:

- Positioning of the Moovbox unit for security and accessibility
- Proximity of power source
- Location of Wi-Fi antenna for optimal cabin coverage
- Location of backhaul and GPS antennas for best reception
- Ease of cable runs between the Moovbox and the antennas

Figure 3.1: A photograph of a Moovbox installation

Moovbox

The Moovbox should be installed in a location where its safe from unwanted casual tampering yet accessible for servicing. This can vary considerably between different types of vehicle. In a car probably the best location is in the boot/trunk. However in larger commercial vehicles finding the right spot will depend on the specific design of the interior. Figure 3.1 shows a Moovbox installed in a coach, behind the cowling between the driver's seat and the passenger door. In this example, the unit has been riveted into place using the four tabs on the underside of the Moovbox enclosure.

Power Source

In most permanent installations it's best to run power directly to the 12-36VDC power input on the Moovbox device. Alternatively, 100-240VAC power can be supplied to the optional PoE unit and then run to the Moovbox over Ethernet cabling. If you plan to move your Moovbox between vehicles on a regular basis, you can use the optional cigarette 12VDC adapter; this is particularly useful in vehicles that have 12V power points in the boot/trunk.

☞ ***Tip:*** Consider inserting an on/off switch inline with the power supply so that you can power cycle the Moovbox independently of the main ignition. This is useful if you need to turn off the device for whatever reason without stopping the vehicle's engine.

Wi-Fi antenna

The 3dBi Wi-Fi antenna supplied with the Moovbox provides enough gain to fill many private and commercial vehicles from cars to single/double decker coaches. However as vehicles begin to fill with passengers their bodies will attenuate the Wi-Fi signal. Before you commit to a permanent position, test your Wi-Fi coverage with a full vehicle. If the coverage is not 100% available throughout, even at a medium signal strength then consider using a directional antenna instead. Figure 3.2 shows an installation on a double decker coach; a patch antenna at the rear of the upper deck radiates the Wi-Fi signal forward and downwards, providing good coverage both upstairs and down, even with a full load of passengers.

☞ ***Tip:*** Make sure you factor the signal loss of the cabling between the Moovbox and antenna when planning your antenna position. You can help compensate for this loss

Figure 3.2: A Wi-Fi patch antenna installation on a double decker coach

by using a larger gauge of quality cable, and increasing the Transmit (TX) power of your Wi-Fi Radio via MoovAdmin.

Tip: Be sure that the combined gain of the TX output of the Moovbox Wi-Fi radio and the antenna do not exceed your country's legal limit; in many EU countries this is 100mW (20dBm) EIRP at 2.4GHz.

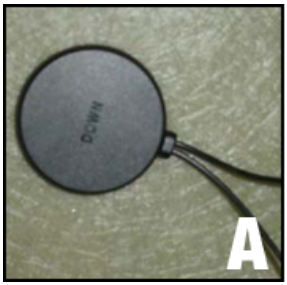
Backhaul Antenna

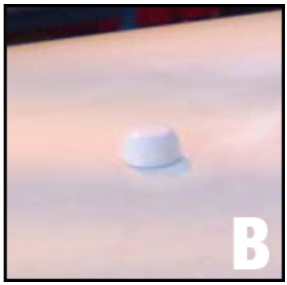
Most vehicles comprise a large amount of metal and attenuate radio signals at varying degrees. As a result good installation planning is essential. Fortunately most mobile carrier networks operate at low frequencies and get good in-vehicle and in-building penetration, so WAN reception should be adequate with dash or window-mount antennas. Icomera recommends a roof-mount antenna, please contact your supplier for available options.

Note: If you are only installing WAN backhaul and not GPS, then you have some flexibility in your choice of antenna location. If you plan to use a combo antenna such as the Moovbox M Series GPS/Cellular Antenna (SKU 3000000003) that provides both cellular and GPS in a single unit, then ensure you choose your antenna position with GPS reception as the determining factor.

GPS Antenna

A GPS antenna requires good visibility of the sky to work properly; it needs to get a fix on three or more satellites in order to generate an accurate position. As a result, a position that works for a WAN antenna may not work for GPS. A good approach is to use an combo antenna and find a dash or roof mount location that works for both GPS and the cellular network. If this is not possible, consider using two different antennas. In smaller vehicles with a well-angled windshield, a dash-mount combo antenna will likely provide good enough GPS reception. But in larger commercial vehicles such as coaches that have vertical windshields, a dash-mount will not work. In these cases consider mounting a puck-style combo antenna inside the roof at the front of the vehicle, where the roof is often made of fiberglass (A). Failing this, a roof-mount (requiring a hole to be drilled in the metal roof) often nets the best result, as the antenna is then outside and fitted on metal groundplane for optimal reception (B).





Note: Contact your supplier for more information about professional installations, as many Icomera Channel Partners are qualified to design your Moovbox deployment.

4 Troubleshooting

If you're having problems with your Moovbox, this section may help you resolve them.

4.1 I can't connect to the Moovbox to configure it

Once you've powered up the Moovbox, you should be able to connect to it via Ethernet by opening any Javascript-enabled web browser and going to `https://192.168.0.10/`.

If you are not prompted for a Username and Password, try the following:

- Make sure you've typed HTTPS and not HTTP.
- Check you've connected the Ethernet crossover cable correctly.
- Check that your computer is set to the same IP range and subnet.
- Reboot the Moovbox and attempt to connect again.

If your problem persists contact your supplier.

4.2 I've configured the Moovbox but can't get online

If you've installed your data card and rebooted the device, but can't get an Internet connection, try the following:

- Check that the WAN modems and SIMs are properly seated and that the pigtails and external antenna is connected.
- Check that you've entered the APN and other information correctly for your specific carrier; this is a common error during configuration.
- Check there is no pin code on the SIM card

- Check to see if the green Status light is illuminated. If it is not, this means the Moovbox is unable to establish a PPP connection with your carrier. Ensure you have carrier coverage in your area by looking at the coverage maps available online from your carrier. If the lights show no coverage, try repositioning the WAN Radio antenna, or move the Moovbox to another location.
- Remove the sim card and test in a phone to confirm the SIM card is enabled and activated.

If your problem persists contact your supplier.

4.3 I can get Internet access but no GPS lock

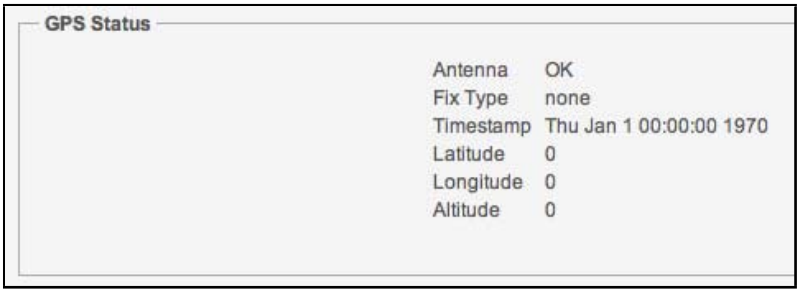


Figure 4.1: The GPS status in MoovAdmin when there is no fix.

If the Status page in MoovAdmin is not showing a GPS fix (see Figure 4.1) try the following:

- Check the external GPS antenna is properly connected.
- Reposition the GPS antenna for a better signal.

If your problem persists contact your supplier.